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Aminoacetal derivative of calix[4]resorcinarene. Acid-base properties and reactions with copper(II) and lanthanum(III) in various media

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Abstract

Studies were carried out by means of pH-metry, spectrophotometry, and mathematic simulation of equilibria (program CPESSP) on the state, acid-base properties and complexing ability [with respect to copper(II) and lanthanum(III)] of calix[4]resorcinol with acetal groups in the aminomethyl substituent [H8L: R1 = C7H15, R 2 = CH2N(CH3)CH2CH 2CH(OCH3)2] in water-alcohol solution [80 vol % of i-PrOH] and in solutions of nonionogenic and ionic surfactants [Triton X-100, Brij-35, sodium dodecyl sulfate]. In all environments protonated and deprotonated tetrameric, dimeric, and monomeric species were found (pH range 3-10.6). In the presence of sodium dodecyl sulfate dimer (H8L) 2 did not form that was the main speciation form in the other solvents. The sodium dodecyl sulfate like also Brij-35 favors formation of a hexadecamer (H8L)16 (pH about 6.3-6.5) in relatively small maximum accumulation fractions, 20 and 16% respectively. The solubility of H8L in acid medium in the presence of cetyltrimethylammonium bromide, and in the presence of sodium dodecyl sulfate in alkaline medium, originated from the formation of mixed cationic and mixed anionic aggregates respectively. In a water-alcohol solution six complexes of copper(II) were detected: four mononuclear, one binuclear, and one tetranuclear complex with neutral and deprotonated forms of the ligand. Lanthanum(III) formed nine mononuclear complexes and in general coordinated more ligands than copper(II) favoring association (aggregation) of the compound under study. © 2008 MAIK Nauka.

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